



INSTALLATION MANUAL PROTRAKKER SONIC IMPLEMENT GUIDANCE BASE KIT

Automatic Steering System for
Self-propelled Machines

Part Number: 560016
Version US 01.01
July 2015
US Version
Printed in USA

All rights reserved

COPYRIGHT © 2015

Reichhardt Electronic Innovations Inc. USA

12 1st Street S

Sabin, MN 56580

Telephone	218-677-1001
Fax	218-677-1002
Internet	www.reichhardt.com/us
Email	info@reichhardt.com

This manual may not be reprinted, copied, or otherwise reproduced without the expressed written consent by Reichhardt Electronic Innovations Inc USA. Distribution of this manual is solely authorized by Reichhardt Electronic Innovations Inc USA. Any unauthorized distribution is within violation of copyright law and involved parties will be subject to prosecution.

All information, pictures, and technical data correspond to the latest publications as of the date of publication. For the content editor, contact the aforementioned information listed above.

Contents

	PAGE
1. Introduction	5
2. Revision History	5
3. Equipment Needed	6
3.1. ProTrakker Hitch Sonic Guidance Platform Kit – 680016	6
3.2. ISOBUS Terminal Options	7
3.3. Optional Additional Adapters	8
4. ProTrakker Hitch Sonic Guidance Kit Component Mounting	9
4.1. iBox LT Mounting	9
4.2. Joystick Mounting	9
4.3. Main Harness Overview	10
4.4. Sonic Kit Mounting	11
5. Main Harness Connections	13
5.1. Introduction	13
5.2. Main Harness Connections	13
5.3. Main Harness Connection Flowchart	14
5.4. Front Plug – X01	15
5.5. Implement Control – X35	16
5.6. Joystick – X33	16
5.7. Armrest – X14	17
5.8. Machine Power / Safety Switch / Speed Signal - XC100	18
5.9. ISOBUS / Display Adapter – X10 / X11A / X11B	19
5.10. Final Check – Wiring	20
6. System Teach-In Settings	21
6.1. System Unlock Code	21
6.2. Accessing Teach-In Menu	22
6.3. Vehicle Setting Code	22
6.4. Hydraulic Valve Initialization	23
6.5. Hitch Orientation	23
6.6. Hydraulic Valve Calibration	24
6.7. Angle Sensor Settings	25
6.8. Joystick Configuration and Calibration	27
6.9. Vehicle Speed Input Setup	28
6.10. Vehicle Safety Switch Setup	30

6.11.	Other Settings/Calibrations	32
7.	Sensor Settings	33
7.1.	Selecting Sonic Steering Mode	33
7.2.	System Engagement	33
7.3.	Joystick Nudge Function	33
8.	Manual Guidance Configuration	34
8.1.	Switching to Manual Steering Mode	34
8.2.	System Engagement	34
8.3.	Return to Center Function	34
8.4.	Manual Control	34
9.	Additional Fine-Tuning / Troubleshooting	35
10.	Final Checks	36
10.1.	Secure Harnessing	36
10.2.	Hydraulics	36
10.3.	Error Codes	36
10.4.	Safety Sticker	36

1. Introduction

This document is for aiding in the basic hardware installation and initial software setup of the ProTrakker Hitch Sonic Guidance Platform Kit.

Please refer to the Ultra Guidance PSR Operator's Manual (560144) for basic setup and operation.

All documentation and screenshots are based on PSR Software Version 2.159.001.

2. Revision History

Revision	Description	By	Date
1.00	Initial Revision	CDB	05/08/15
1.01	Merge in Implement Guidance base kit documentation	CDB	07/17/15

3. Equipment Needed

Installation of the Sonic Implement Guidance system on a ProTrakker hitch requires the 680016 ProTrakker Hitch Sonic Guidance Platform Kit along with a supported ISOBUS terminal kit or adapter.

3.1. ProTrakker Hitch Sonic Guidance Platform Kit – 680016

P/N	Qt	Description
702240	1	PSR iBox LT Control Unit
703159	1	PSR Implement Guidance iBox LT Main Harness
703160	1	PSR ProTrakker Hitch Adapter Harness X35
700405	1	ITT Joystick Kit - X33 Analog
702485	1	Field Installation Universal Machine Adapter Harness
702350	1	PSR CAN Terminator 120 Ohm 4-Pin Deutsch Socket
702351	1	PSR CAN Terminator 120 Ohm 4-Pin Deutsch Pin
700851	1	Mounting Kit - Velcro and Machine Nuts/Bolts
700111	1	Sonic Kit - 4 Sensor Configuration
560144	1	PSR ISO Main Manual and Customer Confirmation Form
560016	1	Installation Manual - ProTrakker Hitch Sonic Guidance Kit
560837	1	Reference Guide - ProTrakker Guidance Kit - SONIC

3.2. ISOBUS Terminal Options

Options for display include a Mueller color ISO VT Terminal or connecting to an existing screen in the cab. A few sample display options are listed below. All display options provide the same menu structure.

Basic Terminal Kit – Reichardt Branded ISO VT – 700010

Small Color ISO VT Screen with harnessing

Item	Qt	Description
110666	1	Basic Terminal – Reichardt Branded
702373	1	Mueller VT ISO Standalone Harness
560010	1	Basic Terminal User Manual – English



Basic Terminal Kit – Challenger Branded ISO VT – 700011

Small Color ISO VT Screen with Harnessing

Item	Qt	Description
110669	1	Basic Terminal – Challenger Branded
702373	1	Mueller VT ISO Standalone Harness
560010	1	Basic Terminal User Manual – English



PSR GreenStar2 ISO Adapter Harness - Power and CAN – 702318

Standalone Harness for providing power and CAN bus connection to main screen connector



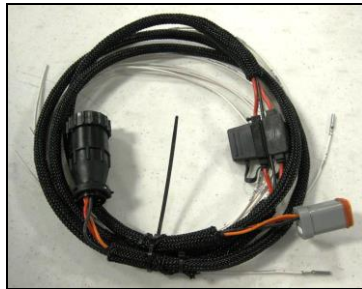
3.3. Optional Additional Adapters

There are several adapter harnesses which can be used in conjunction with the Implement Guidance Base Kit (700754) which may aid in the installation of the system.

Power Adapters

For a safe common power connection point, it may work best to plug into an available accessory power port in the cab. These adapters support the various common power connection points which can be found in most cabs (shown in photos left to right).

- 702793 - PSR Power Adapter 3-Pin AMP CPC to DT
- 702794 - PSR Power Adapter 3-Pin JD to DT
- 702795 - PSR Power Adapter Cigar Plug to DT



Armrest and Indicator Adapters

- 703072 - PSR Accessory Engage Indicator Light (Blue) – This item can be added to the existing main harness to energize a light whenever the implement is being controlled. This provides additional user uniquely mountable system indication independent of the ISOBUS Terminal.



- 110169 / 702375 – Armrest Switch and Adapter – These items can be added to toggle system power independent of key-switch as well as engagement of the system independent of the joystick.



4. ProTrakker Hitch Sonic Guidance Kit Component Mounting

4.1. iBox LT Mounting



An example iBox LT mounting is shown. The iBox LT (702240) should be mounted in a location which is protected from constant wear, such as in an available storage cavity below or behind the operator's seat or buddy seat. The iBox can be fixed-mounted to a surface using the adhesive-backed velcro strips or via 3 machine bolts/lock nuts found in the included mounting kit (700851). It is recommended to securely mount the controller after the harness installation.

Orientation of the iBox controller does not matter.

4.2. Joystick Mounting

700405 – ITT Analog Joystick Kit - Parts List

P/N	Qt	Description
702943	1	ITT Joystick AJ3 X X12 V08 C3 S2J3 24V
800040	1	ITT Joystick Mounting Bottom Bracket
800041	1	ITT Joystick Mounting Top Bracket
330000	1	RAM Kit 1.5" Ball Rail Mount Base
300868	4	Machine Screw 8-32 x 3.5
300010	7	Lock Nut #8-32 Zinc Finish NM
300444	3	Mounting Screw 8-32 x 3/4"
300009	4	Washer #10 Flat

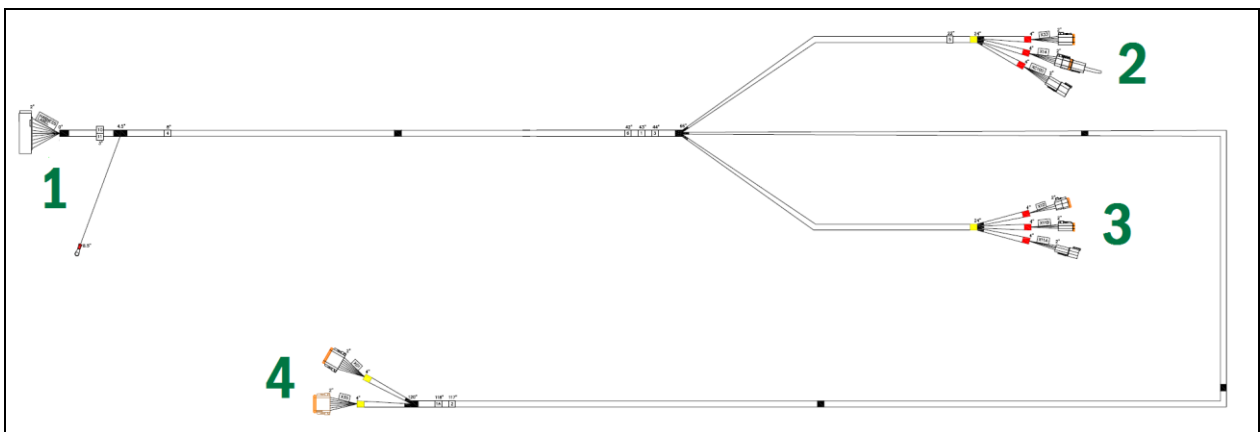


Use the existing Joystick Mounting brackets (800040/800041) to secure the Joystick (702943) to a location in the cab which is easily accessible to the operator. A RAM mount assembly (330000) is also included for flexibility and convenience. An example installation is shown.

4.3. Main Harness Overview

The Implement Guidance Main Harness (703159) contains 4 main sections which have approximately 4-10 feet of lead between them for flexibility it is important to plan out the locations for these items in order to run the harness cleanly/effectively:

1. The iBox main connector with ground wire
2. Tractor Power / Joystick Connection Drops – Connector drop for machine power adapter as well as available pins for speed/safety and a drop for the Joystick connection.
3. ISOBUS Extension or ISOBUS Terminal Adapter drops to connect to an existing tractor ISOBUS or added ISOBUS terminal kit.
4. Implement/Hitch specific drops – Connector for the implement/hitch valve and angle sensor as well as the connector for the sensor guidance input.



Make sure to secure the main harness 42-pin amp connector (1) to the iBox LT. The black/brown ground wire must be attached to the iBox LT housing using hardware included with the Mounting Kit (700851).

Run the main cab harness to a location where it is most convenient to have the in-cab power/Joystick connection drops (2) and the ISOBUS/terminal drops (3). These are often in a location behind or to the right of the operator's seat.

From this location, run the remainder of the main harness (4) out of the cab towards the implement/hitch.

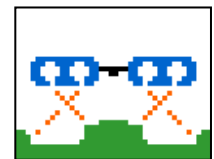
4.4. Sonic Kit Mounting

Sonic Kit Components - 700111

P/N	Sub-Kit P/N	Qt	Description
701764		1	PSR Ultra-Sonic Sensor Quad Kit
	701705	4	PSR Ultra-Sonic Sensor
	701376	1	PSR Sonic 4 Sensor Harness 5M
703274		1	PSR Sonic Resistor Harness X01
702343		1	PSR Front Plug Harness - 12-Pin Deutsch
702348		1	PSR Extension Harness - 12 Pin 5M Deutsch
702347		1	PSR Extension Harness - 12 Pin 3M Deutsch
800003		2	PSR Sonic Weldment Mounting Tee
800002		2	PSR Sonic Tee Lock Top Weldment
300345		4	Flange Nut 1/2"-13 Zinc Finish Case Hardened Serrated
300380		4	Hex Cap Screw 1/2"-13 x 1-1/2" Zinc Finish SAE J429 Grade 5
560111		1	Reference Guide - PSR Virtual Terminal - Sonic

Sensor Mounting Configurations

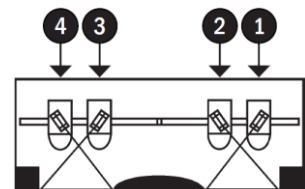
Refer to the Main Operator's Manual (560144) and Quick Reference Guide (560111) for more information regarding different mounting configurations. This section details common mounting for the "Cross Track" pattern shown.



Sensor Orientation

Sensors S1, S2, S3 and S4 should be positioned from left to right with respect to the direction of travel. The connectors for each sensor should be labeled on the Sonic 4 Sensor Harness (701376).

Sensor Orientation is as shown as viewed from the front of the implement.



Sensor Location and Angle

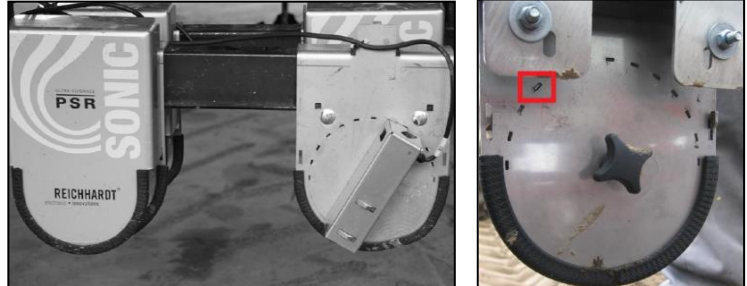


For convenience, weldments (800003 / 800002) are included for vertical and horizontal positional flexibility and adjustments. These can be mounted to a horizontal cross-bar (made from 1 1/2" square tubing) placed in front of the implement. If clearance is an issue, the sensors may be mounted directly to the crossbar (example shown) with its own vertical adjustment.



The Ultra-Sonic Sensors (701705) include internally adjustable carrier arms which can be rotated ± 75 degrees of vertical.

In order to change the angle of the sensor, loosen the nut on the back side of the sensor mount, reach under the cover and rotate the sensor to the desired location. Make sure the sensor carrier arm fits into one of the available slots before tightening. Paired sensors should mirror each other in angle.

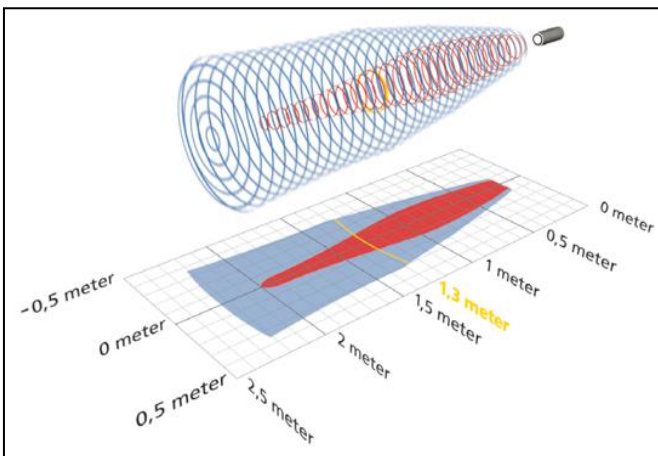
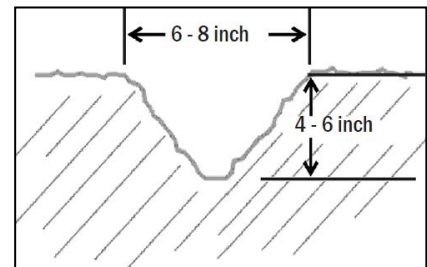


The sensor location is dependent on the steering mode configuration. The 3rd hole from the middle of the plate is commonly used.



The usable range of the Ultra-Sonic sensors is from 10" to possibly as far as 51". Often the surface/angle which the sensor is pointed to limits this range. The ideal mounting window is between 20" and 28", but is usable at closer distances (as long as it's beyond the 10" minimum).

Sonic sensors can recognize plants when about 4" tall. When creating a marker track (furrow), make sure it looks similar to the sketch shown.



The Sonic sensor detection zone is shown as the red area between the sensor and yellow line.

This yellow line "max" distance can be reduced by the target surface and angle.

5. Main Harness Connections

5.1. Introduction

This section lists all necessary harness connections for proper operation of the Pro-Trakker Hitch Sonic Guidance Platform Kit.

Important: Before connecting any electrical harnessing to the machine, disconnect the main battery switch by moving the switch to the position shown.



5.2. Main Harness Connections

Connect the included components as listed below from the main harness out. The numbered "X" plugs are labeled on the connectors.

- ☒ 42-Pin AMP Main Connector -> iBox LT
- ☒ Ground Wire -> iBox LT Frame

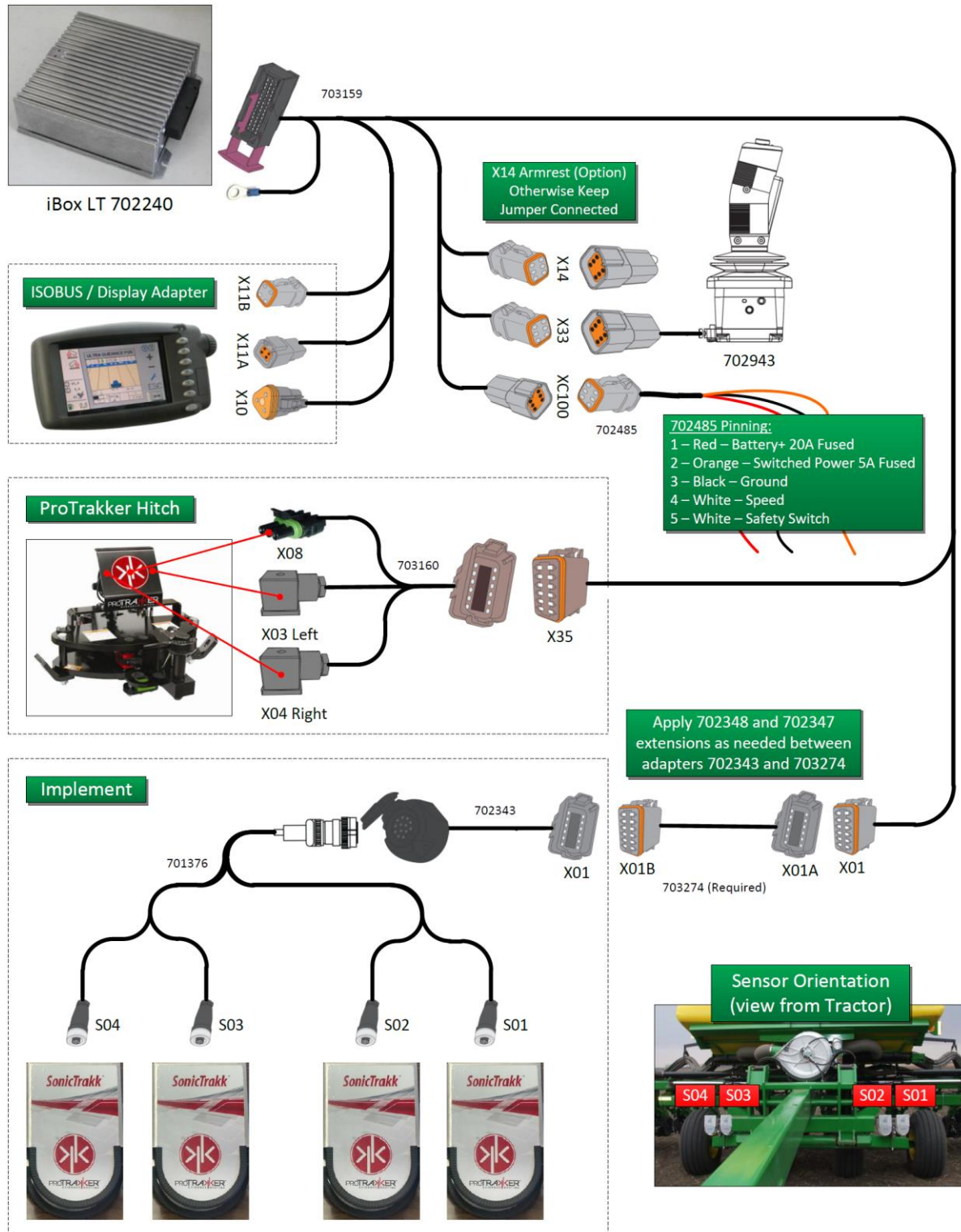
- ☒ X33 Joystick -> 702943 Joystick
- ☒ X14 (Armrest) -> Jumper Cap (leave connected) – Alternatively, a rocker switch can be added to support powering on/off the system independent of key-switch (see section 5.7).
- ☒ XC100 (Machine) -> 702485 Universal Machine Adapter Harness -> Machine Power as well as optional safety switch, speed signal connection points

- ☒ X10 (Power Out) – If needed, can support power to a Reichhardt-sourced ISOBUS terminal or adapter
- ☒ X11A (CAN) and X11B (CAN) -> Used to connect to tractor's ISOBUS extension or applicable display and/or receiver kits.
 - If standalone ISOBUS terminal/harness is needed, included 702350 and 702351 terminators are also used.

- ☒ X01 Front Plug -> 703274 Sonic Resistor Harness -> 702347/702348 Extension Harnesses (as needed) -> 702343 PSR Front Plug Harness -> PSR Sonic 4 Sensor Harness 5M -> 701705 Sonic Sensor (x4)

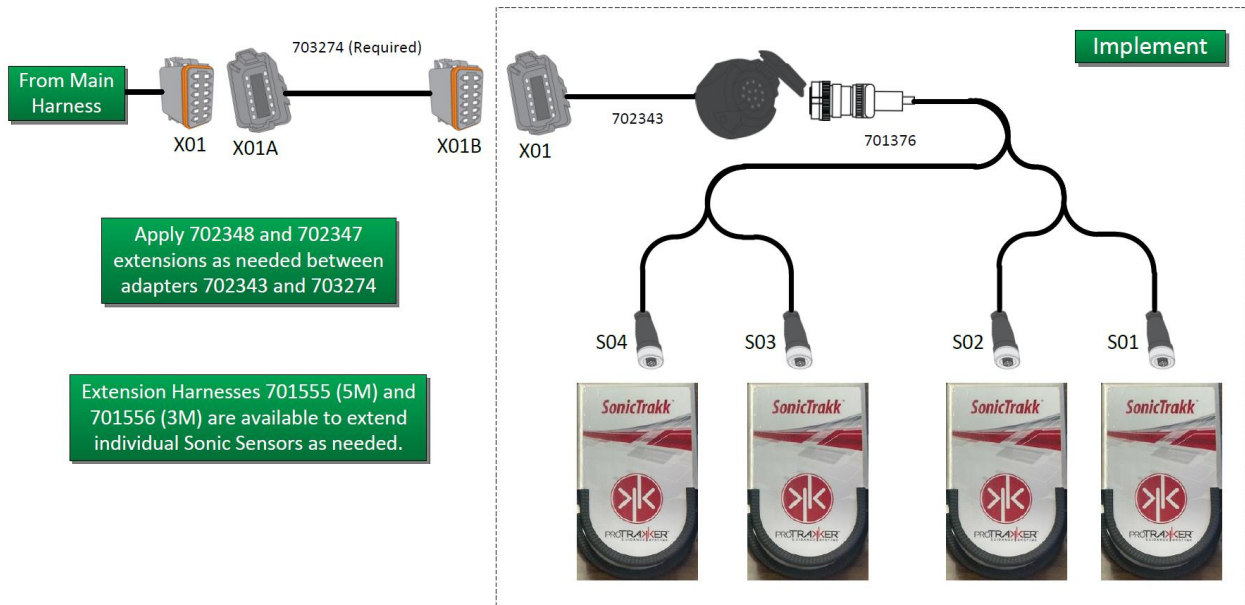
- ☒ X35 Implement Control -> 703160 ProTrakker Hitch Adapter -> ProTrakker Hitch valve and angle sensor

5.3. Main Harness Connection Flowchart



5.4. Front Plug - X01

This connector is used for sensor guidance of the implement, such as the Sonic Sensor kit (700111) as shown below. The system can also be adapted to an existing GPS receiver with a different adapter/kit.

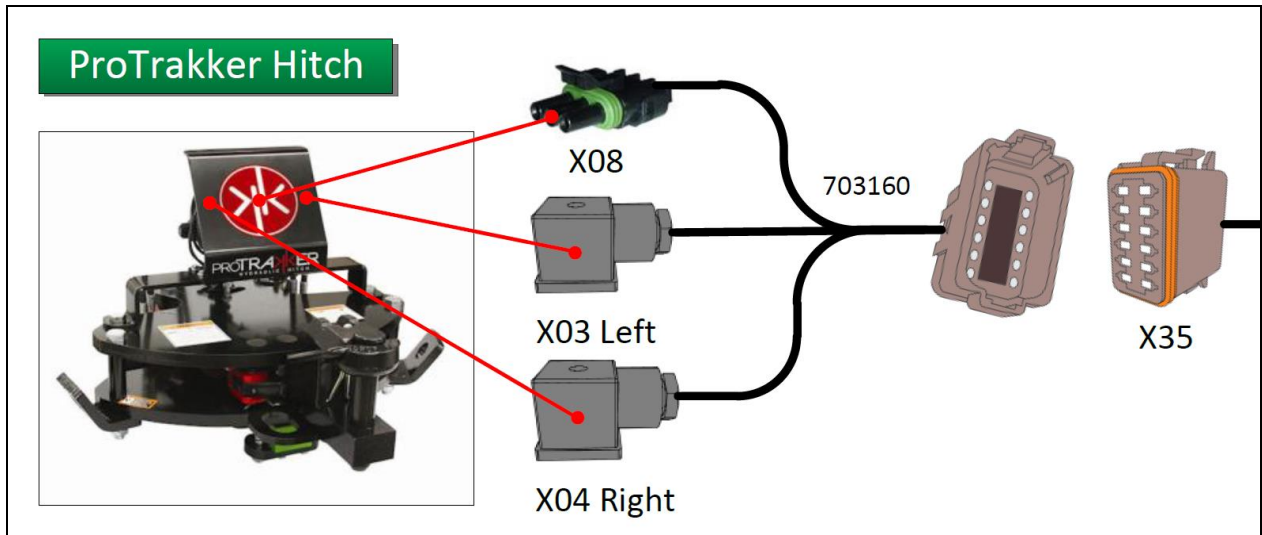


The Sonic Resistor Harness (703274) is required for proper Sonic Sensor functionality. Connect this harness directly to X01 of the main harness. Use extension harnesses (702348/702347) as needed between the sonic resistor harness and front plug harness (702343).

Note: extension harnesses are also available separately for the individual Sonic Sensors as listed above.

5.5. Implement Control – X35

This connection adapts to an implement control (valve and angle sensor), such as the OEM valve and angle sensor on the ProTrakker hitch using harness 703160 as shown.

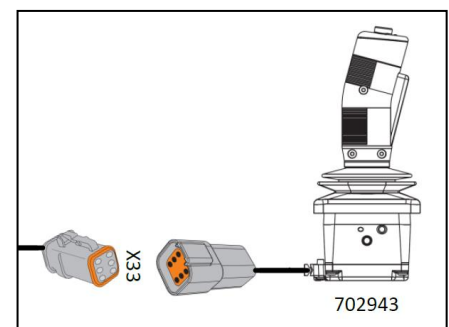


Harness Connection Checklist:

- ☒ **X03 – Control Valve Left** – This DIN connector mates to one of the coils on the ProTrakker valve.
- ☒ **X04 – Control Valve Right** – This DIN connector mates to one of the coils on the ProTrakker valve.
 - **Orientation between X03 and X04 is dictated by plumbing to the manifold.** If found to be backwards during setup, these connectors can be switched at that time.
- ☒ **X08 – Angle Sensor** – This 3 Pin Weather Pack connector mates to the existing ProTrakker angle sensor harness.

5.6. Joystick – X33

The X33 connector on the main harness mates directly to the connector on the included joystick (702943).



5.7. Armrest - X14

The X14 connector is normally capped with a jumper to have the system power on with key-switch.

Alternatively, a rocker switch (110169) and armrest adapter can be added for system power-down independent of key-switch as well as for system engagement.

The optional accessory engage indicator light (703072) also can “Y” into this connection point.

To add the armrest switch, remove this cap and replace it with armrest switch adapter harness (702375) after feeding it through the armrest. The mounting location of the switch is up to preference. Ideally, the adapter harness should be run out of the armrest and follow the main harness loop to avoid snagging. Connectors should be plugged into the appropriate connectors on the main harness and switch as labeled.



In order to provide more space for running the harness through the armrest openings, Deutsch terminals are to be inserted after running the harness through the armrest. Pinning assignments for these connectors are labeled with an “X” on the wires themselves. Please refer to the reference table below for more details on pinning.

702375 - Armrest Switch Adapter Harness Pinning

Pin	Wire Color	Description
1	Brown	GND
2	Orange	Switched Power (Machine Side)
3	Red/Orange Stripe	D+ ESL (Switched Power to iBox)
4	White	Steering Engaged Indicator
5	Gray	Steering Activation Signal
6	None	Open

5.8. Machine Power / Safety Switch / Speed Signal - XC100

Connect the Universal Machine Adapter Harness (702485) to this connection point and run leads to the appropriate connection points. The Universal Machine Adapter Harness (702485) supports power, ground, and switched power to the iBox. Pinning is also supported for a safety switch and vehicle speed, but may not be included on the machine. Pinning is listed below.

The harness includes misc. connectors and open-ended wires for flexibility.

702485 – Universal Machine Adapter Harness Wiring Assignments

Harness pinning is listed below.

Pin	Wire	Description
1	Red	Battery+
2	Orange	Switched Power
3	Black	Ground
4	White	Speed (Optional)
5	White	Safety Switch (Optional)
6	None	Open



Battery Power, Switched Power, Ground

Constant (Battery+), key-switched power and ground connection points vary by machine. There are often clean accessory ports available in the cab area which can support these connection points with an appropriate adapter.

Speed Source Options

A speed source is required for sensor guidance. This can be sourced via an ISOBUS Wheel or Ground-based speed message or via direct pulses from a tractor, implement or other sensor. The latter solution would require wiring to the speed input (XC100 terminal 4).

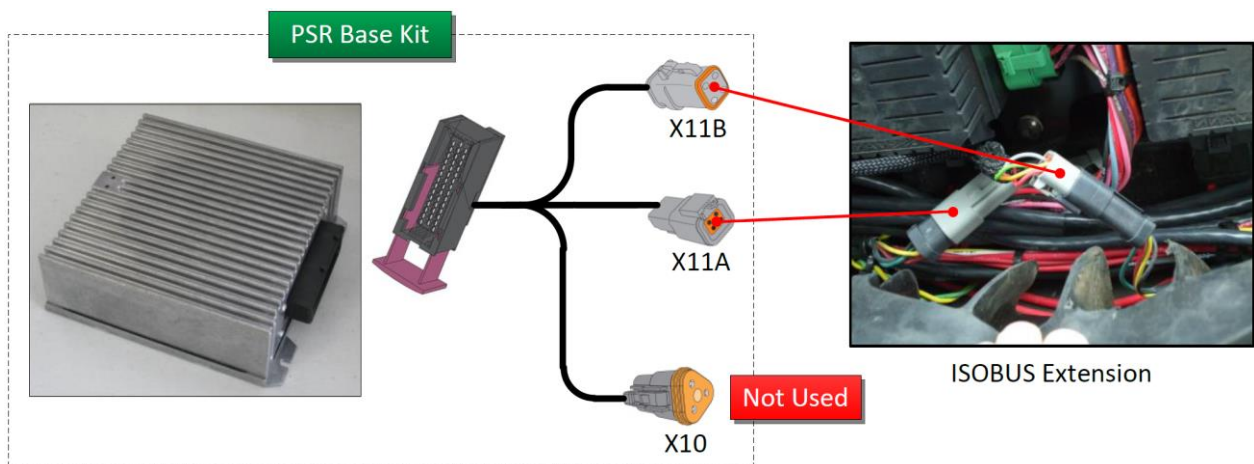
Safety Switch Options

The safety switch input (XC100 terminal 5) can be wired to an existing or installed door, seat or implement mounted switch to disable the Reichardt system when the desired switch state is not met. This can be wired to a normally open or closed ground or 12V signal.

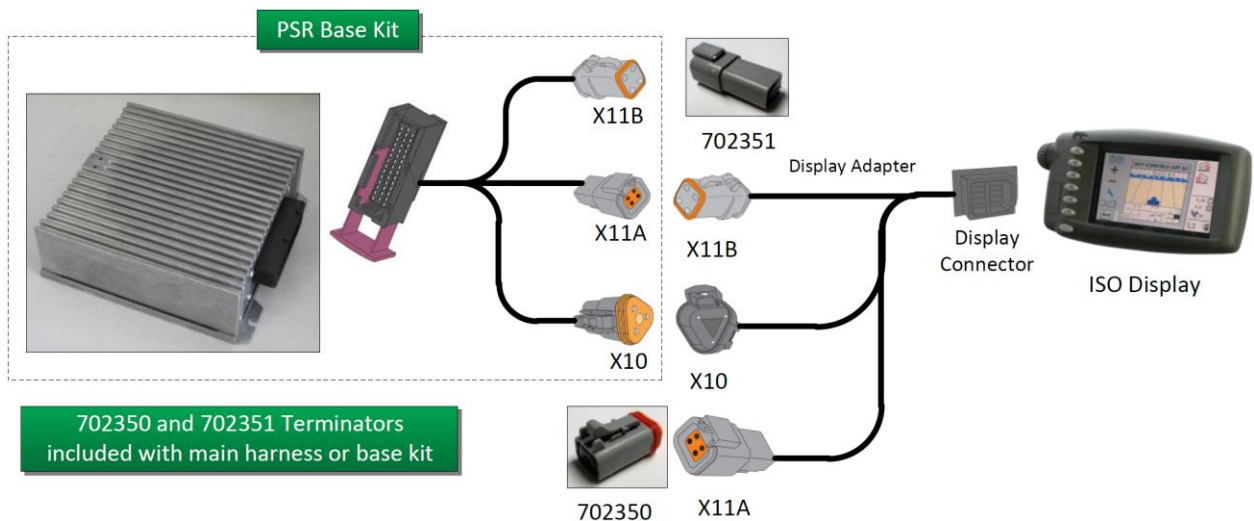
5.9. ISOBUS / Display Adapter – X10 / X11A / X11B

These three connectors are most commonly used in conjunction with an added or existing ISOBUS terminal.

For a tractor with an existing ISOBUS and ISOBUS terminal, X11A and X11B are looped into the ISOBUS extension connector. This is often located in the cab to the right of the driver's seat. In this scenario, the X10 power-out drop should remain capped and unused.



For a tractor with no ISOBUS or terminal, a Reichhardt-sourced adapter and or ISOBUS terminal kit can be added. In this scenario, X10 supplies power to the terminal and passive terminators (702350 and 702351) are used to terminate the added bus as shown.



5.10. Final Check – Wiring

- Verify all connections and secure all harnessing
- Reconnect the battery by re-engaging the battery switch as shown



6. System Teach-In Settings


This set of instructions is for assisting in proper initial setup of the Reichhardt PSR system.


All documentation and screenshots are based on PSR Software Version 2.159.001.





6.1. System Unlock Code

The first step is to unlock a higher level of access on the machine by entering an access code. This allows the user to manually configure vehicle settings. **Note: the system automatically relocks when powering down. The pin will have to be re-entered after any power cycle before accessing most calibration menus.**

From the main screen, press and hold the  button for approximately 2 seconds.

Navigate to and enter the PIN Menu shown 

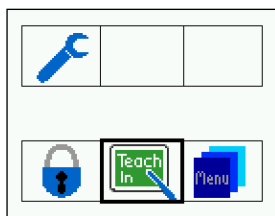
Then enter access code **7371** as shown and press 


  User ID: C7F00FD11F Code : 0000000000	7371 ← <table border="1"> <tr><td>1</td><td>2</td><td>3</td></tr> <tr><td>4</td><td>5</td><td>6</td></tr> <tr><td>7</td><td>8</td><td>9</td></tr> <tr><td>0</td><td colspan="2"></td></tr> </table> Min : 0 Max : -2147483647 ESC ←	1	2	3	4	5	6	7	8	9	0			  User ID: C7F00FD11F Code : 0000007371
1	2	3												
4	5	6												
7	8	9												
0														

6.2. Accessing Teach-In Menu

After entering the access code, the vehicle can be configured from the teach-in page (icon looks like a teaching easel).

The Teach-In Menu allows the user to adjust system settings to a particular vehicle installation and perform initial calibrations of sensors and output devices. To access the teach-in menu:



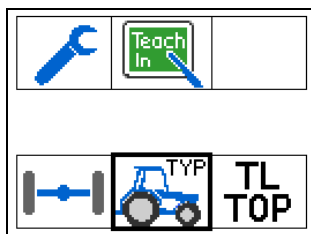
From the main screen, press and hold the  button for approximately 2 seconds.




Navigate to the Teach-In Menu as shown and press



6.3. Vehicle Setting Code


From the Teach-In Menu, enter the Tractor Type Menu






		
Vehicle Code:		
170200001		
Steering mode:	<input type="text" value="1"/>	
Vehicle class:	<input type="text" value="702"/>	
Output settings:	<input type="text" value="0"/>	
Spec. settings:	<input type="text" value="0"/>	

Enter the following vehicle setting code:

1 - 702 - 00 - 00 for ProTrakker Hitch with proportional valve guiding with Sonic Sensors

After entering the vehicle setting code, press  to access the save screen

Select save   and press 

Note: after saving a vehicle code, all settings are changed to default for that specific machine profile.

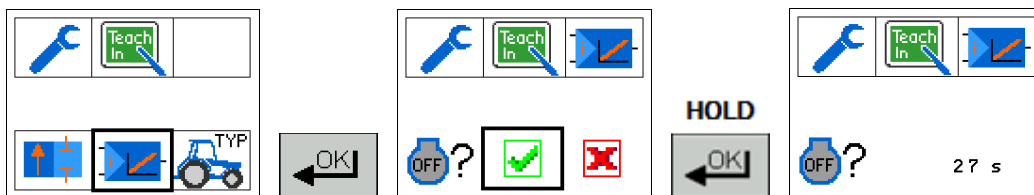
6.4. Hydraulic Valve Initialization

For the ProTrakker proportional valve, a valve initialization calibration needs to be performed. This calibration measures the load of each coil of the valve for a faster response.

Important: these steps will send current to the valve and can move the hitch/implement, so this step should be performed with clearance to move freely.

To perform an initial valve calibration, perform the following steps.

From the teach-in menu, enter the valve initialization menu shown below. Highlight the check mark and hold OK. The system will begin a calibration process which will take 30 seconds to complete. Upon completion, the system will return to the teach-in menu.



6.5. Hitch Orientation

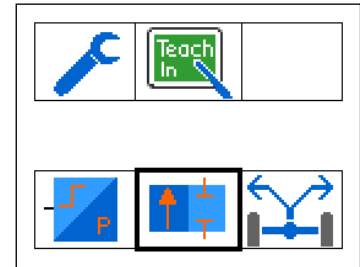


For reference for the following sections, please refer to the diagram below for Left, Middle and Right positions. These positions will be referenced throughout the remaining valve and angle sensor calibrations.

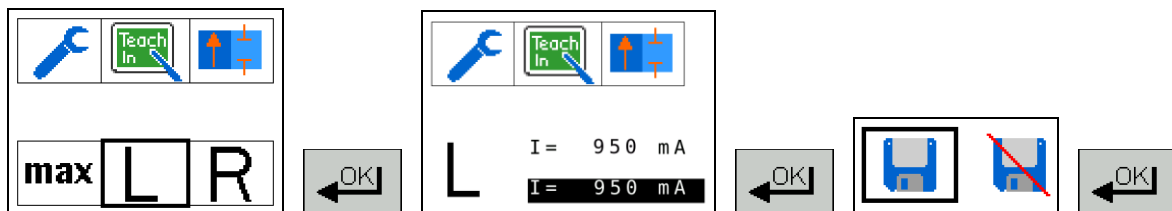
6.6. Hydraulic Valve Calibration

Important: these steps will send current to the valve and will move the machine. Perform these steps should be performed with a safe clearance for the hitch to move. These calibrations should be performed in operating conditions (normal oil flow to the valve, operating engine RPM) as this influences the values entered.

The signal sent to the hydraulic valve for Left Min, Right Min, and the Maximum output can be set in the valve teach-in page under the valve icon shown. Default values are set when the vehicle setting code is programmed in, but more fine-tuning may be needed for each installation.



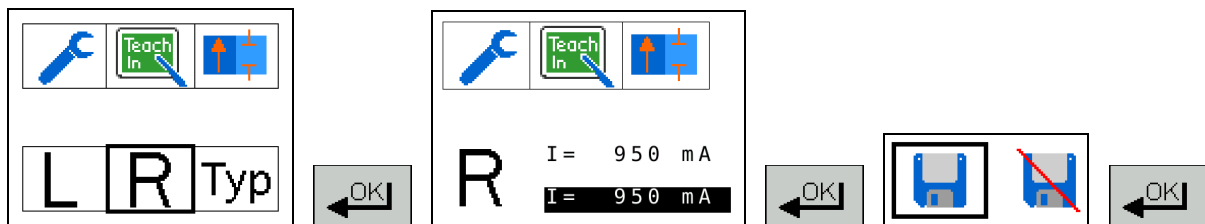
Left Minimum Output Calibration



Note: entering the next menu will drive the valve. From the valve teach-in page, enter the Left valve min output calibration menu shown. The machine may begin turning left if the output is set high enough. Adjust the output value with the “+” or “-” buttons. To set the current value (top value) to the stored value (bottom value), press the OK button to enter the save screen and press OK to save. This step may need to be repeated several times until a desired output value is found. **The goal is to have an output value that slowly moves the hitch to the left.** This is the minimum output of the PSR system to the implement.

Note: if the machine turns right instead of left, connectors X03 and X04 on the valve will need to be swapped and the initial valve calibration (section 6.4) will need to be re-run.

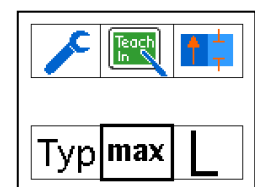
Right Minimum Output Calibration



Repeat the same process for Right as performed for left, the only difference being the hitch will now move right instead of left. The min outputs for left and right should be adjusted to a point where they physically move at the same speed at their calibrated values.

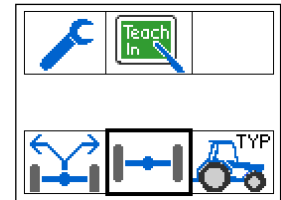
Max Output Adjustment

The value “MAX” is for the maximum output of the system to the valve each left and right directions. Normally this value remains unchanged.



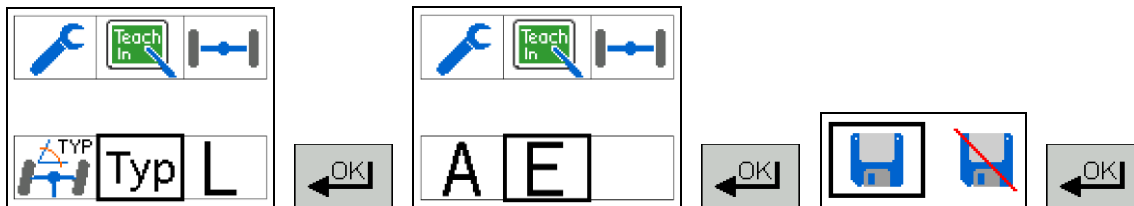
6.7. Angle Sensor Settings

A calibration still needs to be performed to measure the reading from the sensor at full position left, right and middle. Perform the following steps to configure and calibrate the angle sensor.



Sensor Type Setting

From the teach-in menu, enter the angle sensor calibration menu shown. From the angle sensor calibration menu, select and enter the sensor “Typ” menu shown. From the sensor “Typ” menu, select “E” for Voltage Signal (sensor type used by ProTrakker).



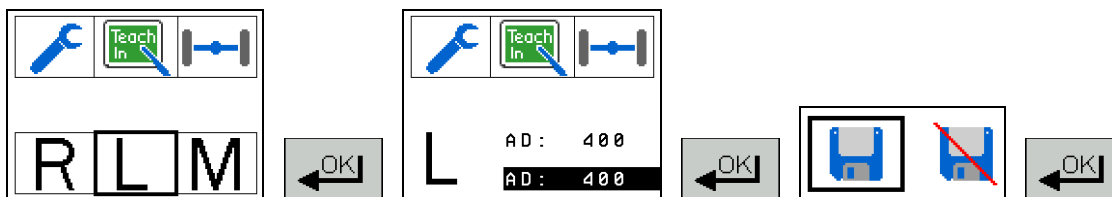
Angle Sensor Left Position Calibration

Using the hydraulic “teach-in” menus, position the hitch to the full left position to calibrate.

From the angle sensor calibration menu, select the left position calibration. Turn the hitch/implement to full left position by pressing and holding the left arrow key in the menu. The top row displays the current reading for the angle sensor. The highlighted bottom row is the stored default reading.

Tip: It is important to verify there is a full range to the sensor when calibrating (the values should change for the full range of motion of the hitch/implement).

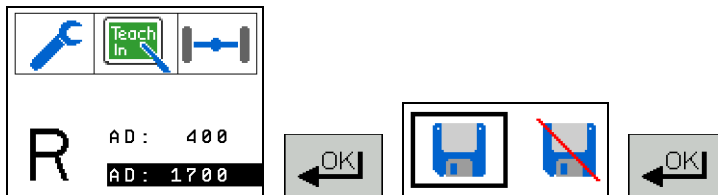
From the wheel angle sensor calibration menu, select “L” for left position calibration.



Angle Sensor Right Position Calibration

Using the hydraulic “teach-in” menus, position the hitch to the full right position to calibrate.

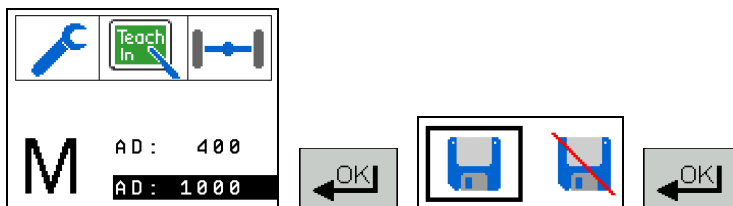
Repeat this calibration for right position by moving the hitch/implement all the way to the right position and calibrating via the “R” menu selection.



Angle Sensor Middle Position Calibration

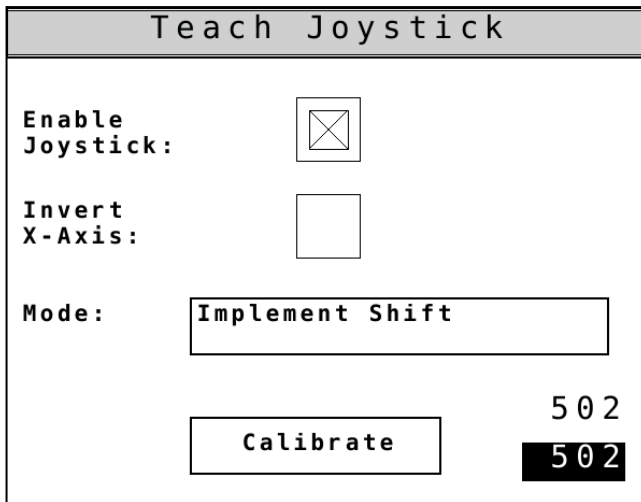
Using the hydraulic “teach-in” menus, position the hitch to the middle position to calibrate.

For Middle position “M”, some measurement may be required. This should be the calibration for the center position of the hitch/implement. Calibrate this value for “M”. **Note: If the middle position calibration is significantly off, the system will consistently track left or right of center, at which point the wheel angle sensor middle position should be recalibrated.**



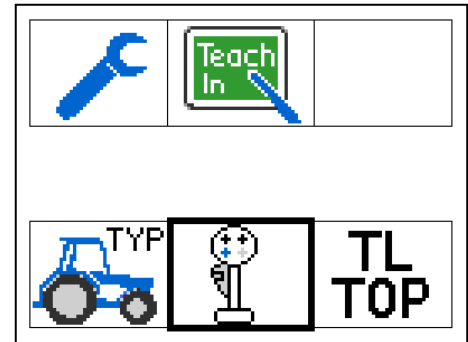
6.8. Joystick Configuration and Calibration

The joystick is used for manual hitch adjustment as well as background nudging while in sensor mode. To configure and calibrate the joystick, perform the steps below. From the teach-in menu, select the “Teach Joystick” menu shown.



The image shows a screen titled "Teach Joystick". It contains the following elements:

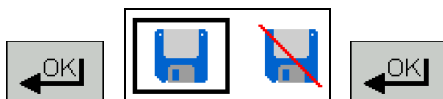
- Enable Joystick:** A checkbox with an 'X' inside, indicating it is checked.
- Invert X-Axis:** An empty checkbox.
- Mode:** A dropdown menu currently showing "Implement Shift".
- Calibrate:** A button.
- Values:** To the right of the "Calibrate" button, there are two numerical displays. The top one shows "502" and the bottom one shows "502" on a black background.



The Teach Joystick Menu is shown.

- Select the check-box to “Enable Joystick” to use the joystick.
- Invert X-Axis is based on operator preference based on the direction they are facing. If this is selected, the hitch will move right when the joystick is moved left and visa-versa.
- Under mode, select “Implement Shift” for standard hitch control features (described later in this manual).
- Next to calibrate there are two values. The top value is the current reading of the joystick position. The bottom value is the calibrated value. When the joystick is in a neutral (centered) position, select “Calibrate” to calibrate this position as neutral. **Note:** Typically a working joystick should have a reading within 5 counts of 500. If this is not the case, verify there is a proper connection between the joystick and main harness and the joystick is in fact in a neutral position.

Once these steps are completed, press the “OK” button to enter the save menu. Press “OK” again to save.



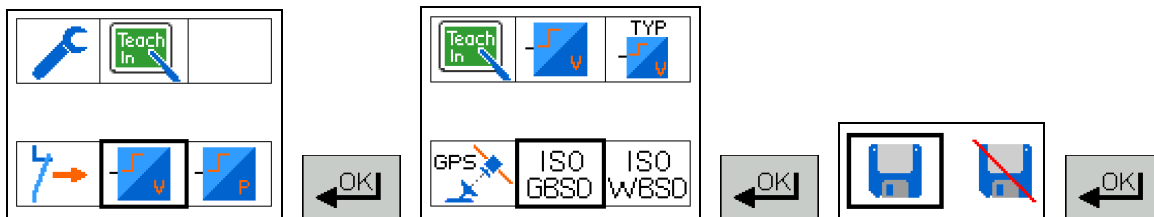
6.9. Vehicle Speed Input Setup

Machine speed is required for the ProTrakker Sonic Guidance System to operate. If on the tractor's ISOBUS, a tractor's ISO Wheel or Ground based speed can be used, if a GPS receiver is installed, the receiver's NMEA2000 CAN messages can be used or NMEA0183 (RS-232) messages can also be used via an adapter. Lastly, radar/pulse-based signals can be used / calibrated.

ISO Bus Speed Reading

To configure use of messages for ISO Wheel Based or Ground based speed, perform the steps below.

From the teach in menu, select and enter the speed input menu. Select either ISO WBSD OR GBSD or Wheel Based or Ground based speed, respectively. Press OK to save.



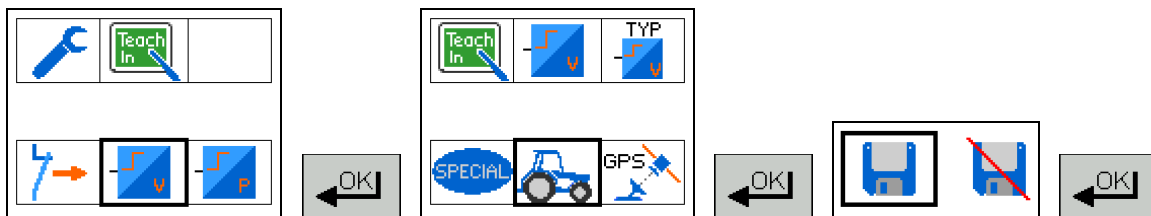
OR



Setting Up On-Vehicle Signal Speed Source

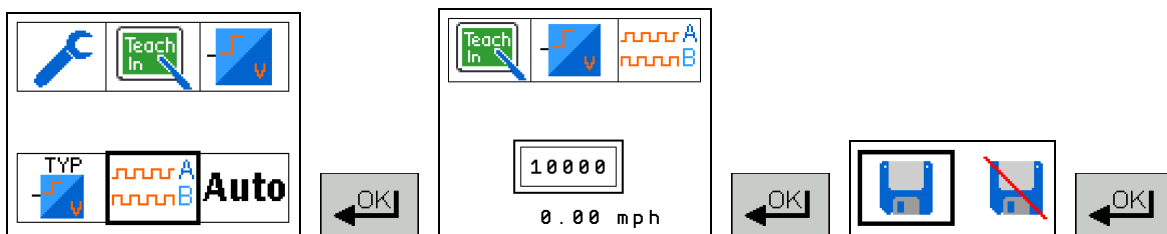
The following steps configure the PSR system to use an on-vehicle signal line for vehicle speed input if no GPS or ISO speed signal is available. **Terminal 4 of Main Harness connector XC100 must be wired to an applicable speed signal for use.**

From the teach-in menu, enter the vehicle speed input menu shown below. Select the Tractor as the speed input type. Press OK to save.

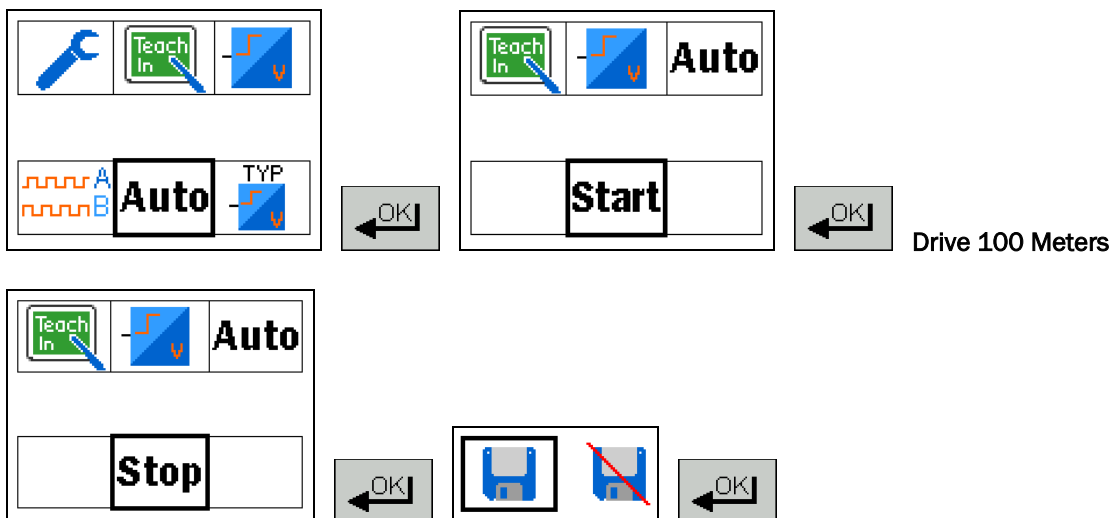


At this point, two methods of speed input calibrations can take place.

One way is to enter the value for pulses per 100 meters of travel. This can be adjusted while moving and comparing with an existing in-cab readout for speed. Press OK to save.

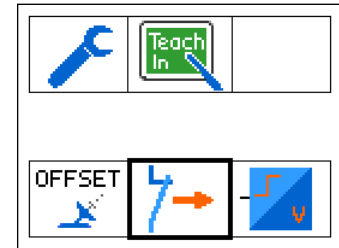


Alternatively, "Auto" can be selected, which counts pulses while driving 100 meters and stores that value. From the "Auto" menu, a flashing "Start" will appear. Press OK and a flashing "Stop" will appear. Drive 100 meters, Press OK to save.



6.10. Vehicle Safety Switch Setup

The PSR system has an available input for operator safety which can be wired to a door-switch, seat-switch, etc. which can be configured to disable the auto-steer system when the switch is in an undesired state (IE cabin door open). This input is configured from the safety switch input configuration menu shown, which is located within the teach-in menu. This input can be configured to check for a normally open or closed ground or 12V signal for operation.

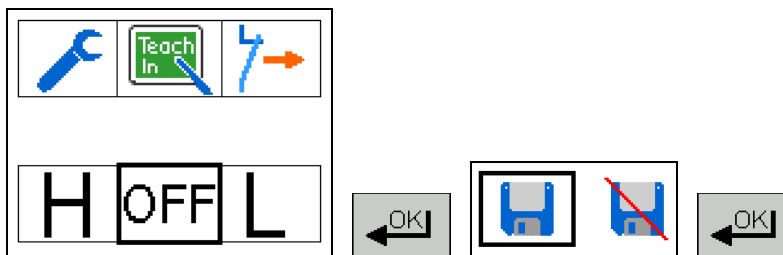


Terminal 5 of Main Harness connector XC100 must be wired to an applicable safety switch signal for use.

Note: If the system is engaged when in an undesired state, an error code 1020 will occur.

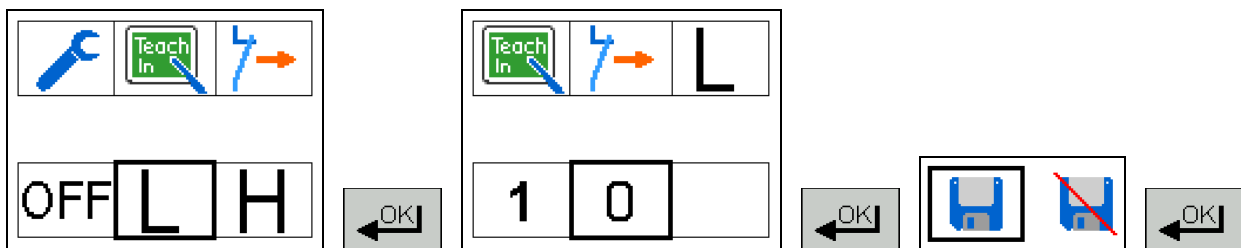
Safety Switch Input IS NOT Used

If the safety switch input is not wired for use:

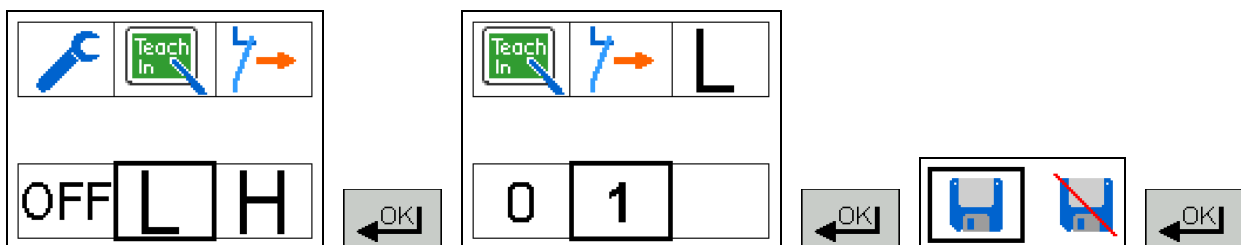


Safety Switch Input IS Used – Ground Signal

If the switch is normally closed (ground state at controller) when system should be operational:

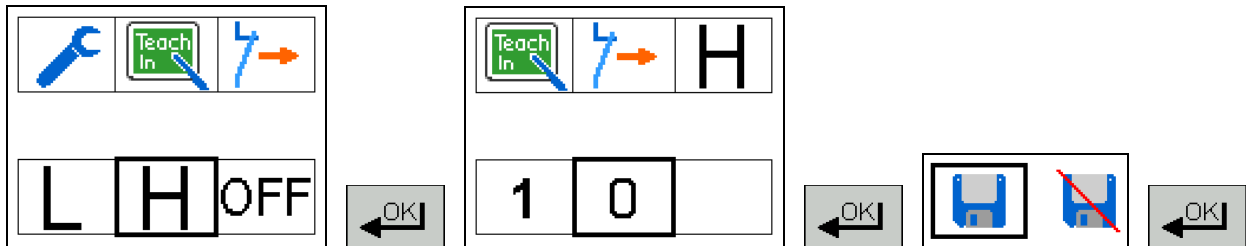


If the switch is normally open when system should be operational:

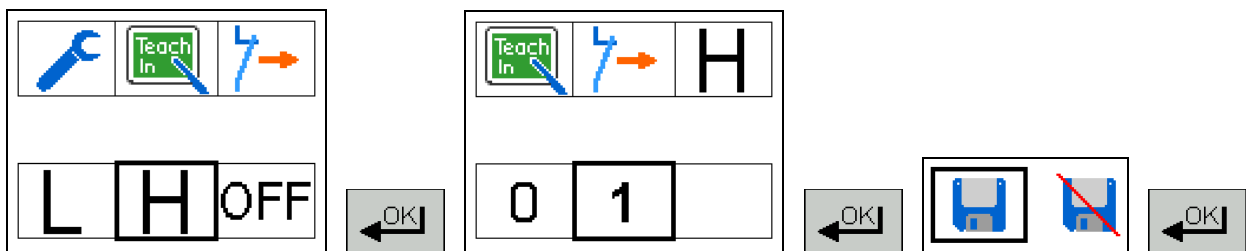


Safety Switch Input IS Used – 12V Signal

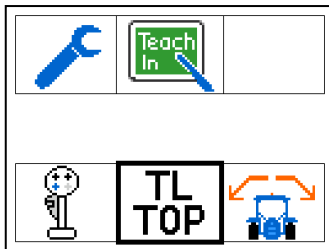
If the switch is normally closed (12V state at controller) when system should be operational:



If the switch is normally open when system should be operational:

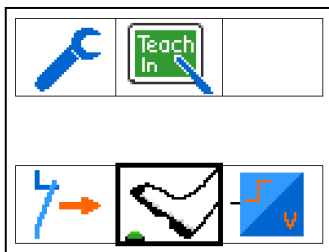


6.11. Other Settings/Calibrations



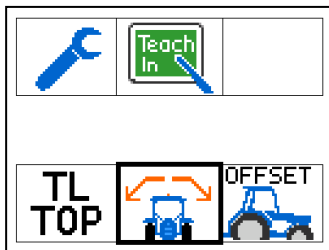
Track-Leader Top

SKIP THIS MENU IF NOT USING GPS GUIDANCE WITH TRACK LEADER TOP - This menu is related to integrated GPS guidance with a Reichardt terminal using Track Leader top and is not applicable for implement Guidance.



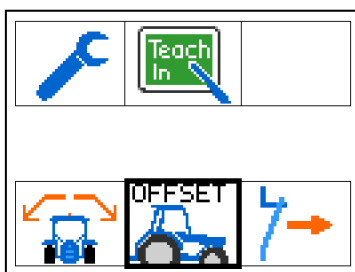
Footswitch

SKIP THIS MENU IF USING JOYSTICK - This menu is related to using a 3rd party footswitch instead of the joystick for system engagement



Tilt Sensor Calibration

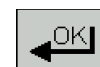
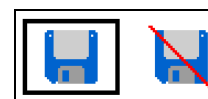
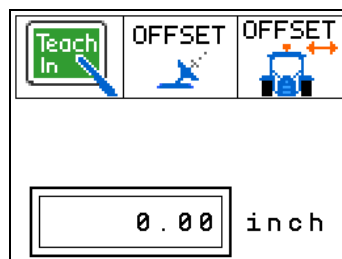
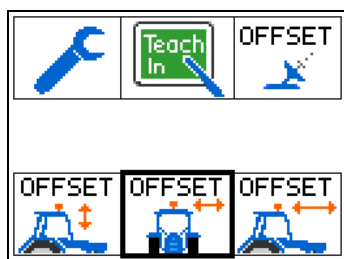
SKIP THIS MENU IF NOT USING GPS GUIDANCE - This menu is for terrain compensation of a GPS receiver mounted to the implement.



Receiver Offset

If using Sonic Guidance, enter this menu and change height offset to 0" and save it. Otherwise, this will trigger an error with 2.159.001 software that these settings have not been calibrated. These settings do not influence Sonic Guidance.

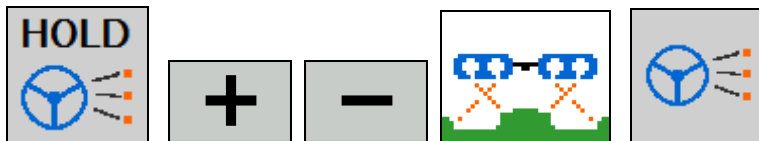
This menu is for configuration of a GPS receiver mounting geometry on the implement.



7. Sensor Settings

7.1. Selecting Sonic Steering Mode

From the main screen, press and hold the steering mode button until it begins flashing. Use the +/- buttons to change to the desired steering mode. Tap the flashing steering mode button to set the steering mode.



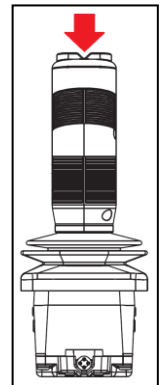
7.2. System Engagement



To guide by Sonic Sensors, the system must be engaged with speed. There must be no active errors (system engage button on the main screen will be white) as shown to allow system engagement.



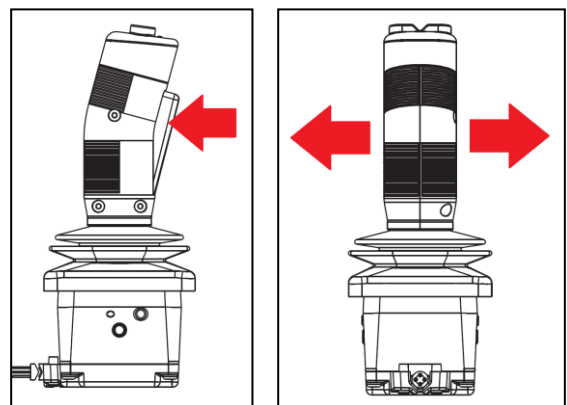
To engage the system, momentarily press either of the top buttons of the joystick shown. Alternatively, press the system engage button on the main screen. The system engage button will turn green as shown.



Note: These same functions are also used to disengage the system.

7.3. Joystick Nudge Function

When the system has speed and is engaged in Sonic Steering mode, the system can be nudged by holding the trigger of the joystick shown and moving the joystick right or left. Once the desired nudge is reflected in the hitch position, release the trigger. This value will remain stored in the background of the system, and will reset whenever switching to/from manual steering mode (see section 8.1).

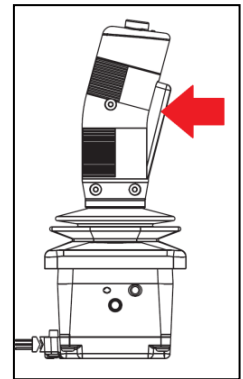
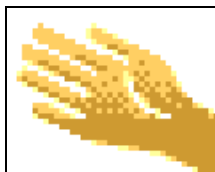
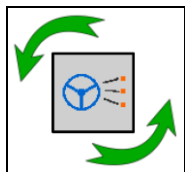
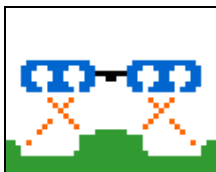


8. Manual Guidance Configuration

8.1. Switching to Manual Steering Mode

The purpose of Manual Steering mode is for manual control or return to center of the hitch while in the headlands. Once a standard steering mode is selected (see section 7.1), tap the steering mode button to toggle between automatic (Sonic) guidance and manual steering modes.

This same function can be performed by tapping the trigger of the joystick.



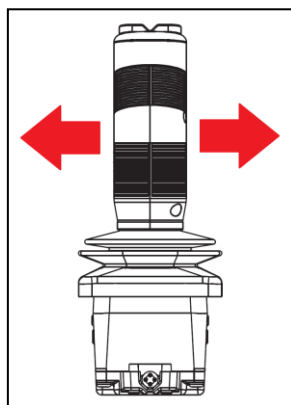
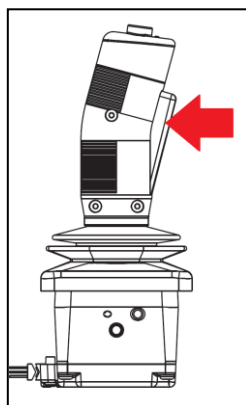
8.2. System Engagement

System engagement is the same as Sonic mode (see section 7.2), but **in the case of manual guidance, no speed input is needed to move the hitch.**

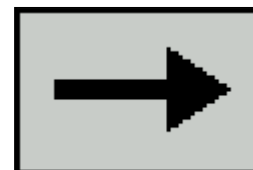
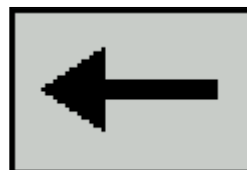
8.3. Return to Center Function

If the system has speed and is engaged, the hitch will automatically return to center position when switching to manual mode.

8.4. Manual Control



When the system is engaged in manual mode, holding the trigger and moving the joystick left or right will move the hitch. Release the trigger to end manual control. Alternatively, the left and right arrow keys on the main screen can be held to move the hitch to a desired position.



NOTE: when moving the hitch in manual mode, there is some lag between the input to the joystick and the output to the hitch. Discontinue moving the joystick prior to the destination position to avoid overshoot. This can also be assisted by adjusting the main screen sensitivity of the system while in manual mode.

9. Additional Fine-Tuning / Troubleshooting

Various machine/implement geometry and varied sensor mounting locations may require additional fine tuning. If after running a test drive and adjusting the main system reaction, the machine does not maintain a stable pattern or proper position in a timely manner, there are several additional settings which can be fine-tuned for special applications.

System Calibrations

Verify Valve Calibration – If the system is guiding overly aggressive or lazy, and adjustments to the main screen sensitivity do not resolve the issue, it may be important to re-calibrate the valve per instructions in sections 6.4 and 6.6. **Tip:** Adjusting main screen sensitivity is described in included reference guides 560837, 560111 as well as the main operator's manual.

Verify Angle Sensor calibration - If the angle sensor readings are off (especially center position), this can have a large negative effect on guidance. Verify center position and endpoints by comparing stored teach-in values with current readings for left/center/right positions. Repeat calibration as needed (section 6.7).

For Sonic Sensor Guidance

Verify sensor mounting – Verify sensor orientation and proper positioning - see section 4.4

Verify sensor readings – check sonic sensor readings in system diagnostics. From the main screen, press and hold the wrench button. Go to diagnostics, press OK. Select the tractor, press OK. The sonic sensor readings for S1, S2, S3 and S4 should be visible in the first two pages (press the right arrow key to go to the second page). The values displayed are in 1/4" increments.



If the sensors are not detecting or are out of range, they will display a value of 236. An open wire or missing/damaged resistor harness can also display this value.

Adjust Sonic Sensor Sample Spacing – the sonic sample spacing can be adjusted to change how aggressive the system detects deviation in the field. A low sampling is less aggressive while a high setting is more aggressive. While in sonic steering mode, from the main screen, tap the wrench button to enter the sonic settings menu. Select the sample spacing menu shown and press OK. Select the desired spacing setting (L for low, M for medium, H for high) and hold OK to enter the save menu. Tap ok to save.



10. Final Checks

10.1. Secure Harnessing

Verify wiring harness are routed to avoid being caught/worn by moving parts and are securely fastened with zip ties.

10.2. Hydraulics

Verify all fittings and adapters are tightly secured with no oil leaks present during machine operation

10.3. Error Codes

All error code descriptions can be found within the PSR Main Operator's menu enclosed with item 560144. If there is an error present that does not exist in this document, refer to the release software-specific documentation or contact Reichhardt support.



10.4. Safety Sticker

Make sure the road safety sticker which is enclosed with item 560144 is attached to a visible location in the cab.